Hydrogen Europe:
European Hydrogen & Fuel cell Project Database

Project CISTEM

Construction of Improved HT-PEM MEAs and Stacks for Long Term Stable Modular CHP Units

The vision of the CISTEM project is to develop a new fuel cell (FC) based CHP technology, which is suitable for fitting into large scale peak shaving systems in relation to wind mills, natural gas and SMART grid applications. The technology should be integrated with localized power/heat production in order to utilize the heat from the FC via district heating and should deliver an electrical output of up to 100kW. Additionally the CHP system should be fuel flexible by use of natural gas or use of hydrogen and oxygen which can be provided by electrolysis. This gives the additional opportunity to store electrical energy in case of net overproduction by production of hydrogen and oxygen for use in the CHP system and gives an additional performance boost for the fuel cell. The main idea of the project is a combined development of fuel cell technology and CHP system design. This gives the opportunity to develop an ideal new fuel cell technology for the special requirements of a CHP system in relation to efficiency, costs and lifetime. On the other hand the CHP system development can take into account the special advantages and disadvantages of the new fuel cell technology to realize an optimal system design. The purpose of the CISTEM project is to show a proof of concept of high temperature PEM (HT-PEM) MEA technology for large combined heat and power (CHP) systems. A CHP system of 100 kWel will be set up and demonstrated. These CHP system size is suitable for district heat and power supply. The system will be build up modularly, with FC units of each 5 kWel output. This strategy of numbering up will achieve an optimal adaption of the CHP system size to a very wide area of applications, e.g. different building sizes or demands for peak shaving application. Within CISTEM at least two 5 kWel modules will be implemented as hardware; the remaining 18 modules will be implemented as emulated modules in a hardware in the loop (HIL) test bench. The advantages of the 5 kW modular units are: suitable for mass production at lower production costs, higher system efficiency due to optimized operation of each unit, maintenance “on the run”, stability and reliability of the whole system. With the help of the HIL approach different climate conditions representing the European-wide load profiles can be emulated in detail. Furthermore, interfaces to smart grid application will be prepared. Increased electrical efficiency for the FC will be obtained by the utilization of oxygen from the electrolyser which is normally wasted, as well as by general improvement of the FCs. Besides, the overall energy efficiency will also be improved by utilization of the produced heat in the district heating system. The latter is facilitated by high working temperature of the HT-PEM FC (i.e. 140 - 180˚C).

Project Information

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Timing : 01/06/2013 > 30/09/2016
Project website: http://www.project-cistem.eu/
Project Budget : 6.097.180 €

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Project partners

Coordinator :
DLR Institute of Networked Energy Systems
Partners :
Danish Power Systems
UCT Prague (University of Chemistry and Technology, Prague)
CISTEM
INHOUSE ENGINEERING GMBH
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Sub project(s)

Sub project 1

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Sub project categories
Research

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